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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 07/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/078,285

Applicant(s)

AHN ET AL.

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/446,862.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20020625.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of iron-chromium-nickel alloy (stainless steel) fiber as the metal fiber additive and $\text{Li}_{1-x}\text{A}_x\text{Ni}_{1-y}\text{B}_y\text{O}_2$ (where A = alkaline earth metal, B = transition metal, $0 \leq x \leq 0.1$, $0 \leq y \leq 1.0$) as the cathode material in the reply filed on 5/3/2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claim 5 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 5/3/2004.

Specification

3. The abstract of the disclosure is objected to because it contains grammatical and spelling errors. For example, the phrase "a compound having a structure that products of reacting a lithium ion with an electrolyte salt or an electrolyte solvent are capable of deposition or precipitation" is grammatically awkward. In the penultimate line of the abstract, "interal" should be "internal". Correction is required. See MPEP § 608.01(b).

Claim Objections

4. Claim 6 is objected to because of the following informalities: In claim 6, LiClO₄ appears twice in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 10, the limitation "said additive is a mixture of two or more metal fibers different in size" is not in the original disclosure.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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In claim 3, the limitation " $\text{Li}_{1-x}\text{A}_x\text{Ni}_{1-y}\text{B}_y\text{O}_2$ (where A = alkaline metal or alkaline earth metal, B = transition metal, $0 \leq x \leq 0.1$, $0 \leq y \leq 1.0$)" is indefinite because it is unclear what the relationship is between y and 1.0. For the purposes of prosecution of the instant claim, this range is interpreted as " $0 \leq y \leq 1.0$ " in light of the specification. Furthermore, it is unclear to the Examiner what the difference is between alkaline metal and alkaline earth metal because an alkaline earth metal is an alkaline metal.

Claim Interpretation

9. It is noted that applicant did not explicitly define the term "aspect ratio". However, it is noted that applicant mentions "height/diameter ratio" on page 7, line 9 of the specification. The term "aspect ratio" is interpreted as height/diameter in light of page 7, line 9 of the specification and the examples provided on pages 7-11 of the specification.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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11. Claims 1-4, 6-9, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Isoyama et al. (US 5,494,762).

Isoyama et al. disclose a rechargeable lithium ion battery comprising a cathode, an anode, an electrolyte, and a separator, where the cathode (the positive electrode) comprises a positive electrode active material covering the surface of a current collector and the positive electrode active material contains a conductive chip (col. 1, lines 43-47; col. 2, lines 1-10; Figure 22). The positive electrode material includes a metallic compound capable of occluding or releasing lithium and an example includes LiNiO_2 which reads on the formula $\text{Li}_{1-x}\text{A}_x\text{Ni}_{1-y}\text{B}_y\text{O}_2$ when x is 0 and y is 0 (col. 5, lines 13-26). The negative electrode comprises lithium or a lithium alloy (col. 5, lines 33-37). The nonaqueous electrolyte interposed between the positive electrode and the negative electrode comprises a lithium salt such as LiPF_6 , LiClO_4 , LiBF_4 , LiAsF_6 , or LiCF_3SO_3 in propylene carbonate, diethyl carbonate, dimethoxyethane, or gamma-butyrolactone (col. 5, lines 39-44). A separator is interposed between the positive electrode and negative electrode and the separator can be a porous polyolefin membrane (col. 5, lines 45-48). The reference also discloses that with respect to each aspect of the invention of the reference, construction of the secondary cell other than those specified in each aspect of the invention are known in the art or as disclosed in the other aspects of the invention (col. 5, lines 1-11).

The conductive chip in the positive electrode active material may comprise a fiber comprising the collector material and the diameter of the fiber is preferably in the range of from 2 to 7 micron and the aspect ratio of the fiber is preferably in the range of from 5 to 70 and it is preferred for the fiber to be contained in an amount of 2 to 15% by weight of the positive electrode material (col. 13, line 64 to col. 14, line 66). The current collector material can be

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carbon fiber, graphite fiber, and stainless steel (col. 13, lines 20-24). Thus, the fiber of the conductive chip may be made of stainless steel.

The reference also discloses that the positive electrode comprises a collector and a positive electrode active material covering the collector and that the positive electrode active material may be produced by kneading the metallic compound powder with a conductive agent, a binder, etc. or stirring these materials in a liquid phase which would give a dispersion (col. 16, lines 42-52).

The reference also discloses that the positive electrode is made by mixing the positive electrode active material (the metallic compound powder) with a binder and a conductive agent to provide a mixture that is then molded into a sheet as the positive electrode (col. 8, lines 48-55).

12. Claims 1-4, and 6-12 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Yoshida et al. (US 6,338,920 B1).

See abstract, Figures 2 and 4, col. 1, lines 5-12; col. 2, lines 19-48; col. 3, lines 22-55; col. 4, line 38 to col. 5, line 35; col. 5, line 60 to col. 6, line 4; col. 6, lines 52-56; col. 7, lines 38-52 of the reference.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US Pat. No. 5,707,756) in view of Isoyama et al. (US 5,494,762).

Inoue et al. disclose a method of manufacturing a rechargeable lithium ion battery comprising the steps of:

- a) preparing a suspension by adding graphite and acetylene black to the electrode active material LiCoO_2 (col. 41, lines 46-56);
- b) applying the suspension to a collector (col. 41, lines 53-56); and
- c) heating the coated current collector (col. 41, lines 58-62).

Instead of graphite and acetylene black as the conductive agent, metal fibers may be used (col. 18, lines 6-22). In addition to LiCoO_2 , the electrode active material may also be Li_xNiO_2 , and $\text{Li}_x\text{Co}_a\text{Ni}_{1-a}\text{O}_2$, where x is 0.2 to 1.2, and a=0.1 to 0.9 (col. 11, lines 38-44).

Inoue et al. does not disclose that the metallic fiber can be stainless steel, adding 0.1% to 50% by weight of the stainless steel fiber to the electrode active material, and that the stainless steel fiber has a diameter from about 0.5 to about 25 microns and an aspect ratio of from about 4 to about 2500.

Isoyama et al. teach adding stainless steel fiber having a diameter in the range of from 2 to 7 microns and an aspect ratio of the fiber in the range of from 5 to 70 in an amount of 2 to 15% by weight of the positive electrode active material such as LiNiO_2 in a lithium rechargeable

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battery (col. 13, line 64 to col. 14, line 66) because adding stainless steel fiber having diameter, aspect ratio and amount taught by Isoyama et al. to the positive electrode active material in a lithium rechargeable battery renders the electronic conduction within the positive electrode active material uniform so that the internal resistance can be lowered which results in an increased energy capacity (col. 15, lines 27-36).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add 0.1% to 50% by weight of the stainless steel fiber having a diameter from about 0.5 to about 25 microns and an aspect ratio of from about 4 to about 2500 as the conductive agent to the electrode active material of Inoue et al. because adding the stainless steel fibers having diameter, aspect ratio and amount taught by Isoyama et al. to the positive electrode active material in a lithium rechargeable battery renders the electronic conduction within the positive electrode active material uniform so that the internal resistance can be lowered which results in an increased energy capacity. Furthermore, the use of stainless steel as the metallic fiber material is desirable in a lithium battery because it can withstand the corrosive environment of the battery.

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ *Susy Tsang Foster*

Susy Tsang-Foster
Primary Examiner
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